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(58) Field of search

UK CL (Edition J) F2G G4A

INT CL⁴ F16L

(54) **Pipe connectors**

(57) A connector interposed between a small-diameter metallic pipe P with a collar end wall P₂ and a flexible hose H comprises a joint 1 formed with a through hole 2, a protrusion wall 4 and two cylindrical walls 3, 5 projecting therefrom on either side, and a retainer having an engaging wall 7 formed with an opening adapted to be engaged with one cylindrical wall 3, and a plurality of elastic arm walls 8 with click walls 8a. In use, the cylindrical wall 3 is inserted in the metallic pipe P, the other cylindrical wall 5 is inserted in the flexible hose H, and the collar end wall P₂ and the protrusion wall 4 are resiliently clamped between the engaging wall 7 and the click walls 8a.

FIG.1

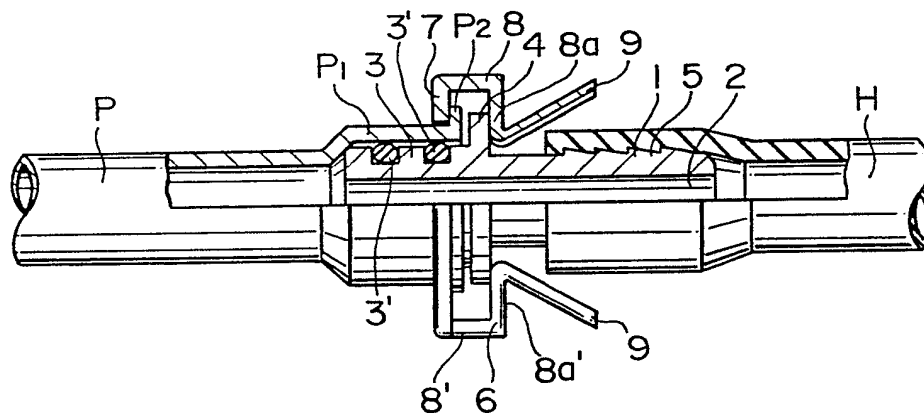


FIG.1

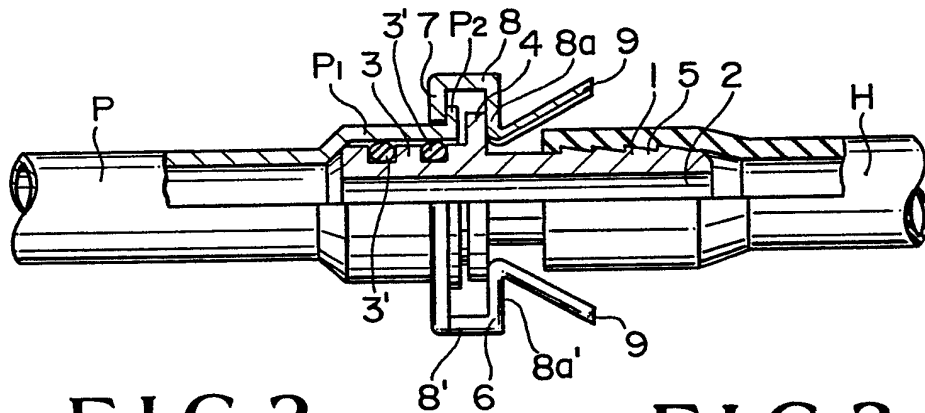


FIG.2

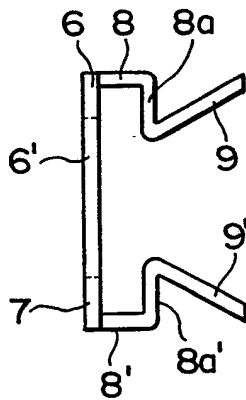


FIG.3

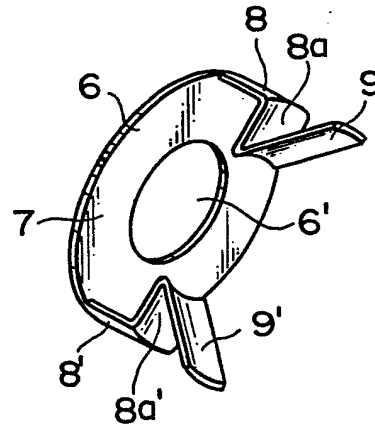


FIG.4

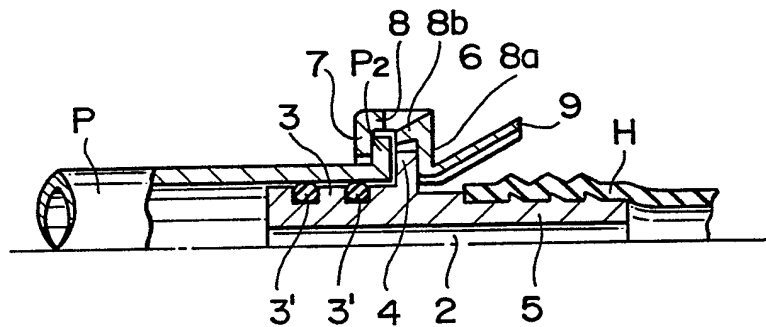


FIG.5(a)

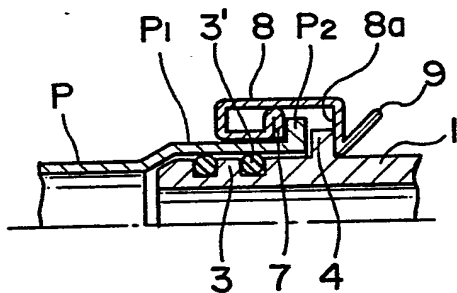


FIG.5(b)

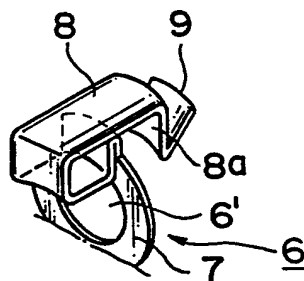


FIG.6(a)

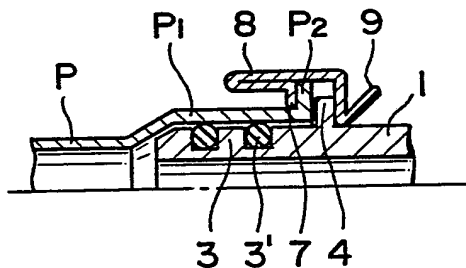


FIG.6(b)

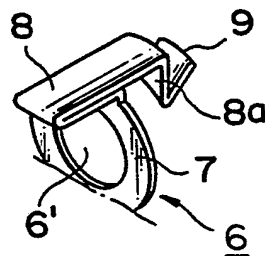


FIG.7

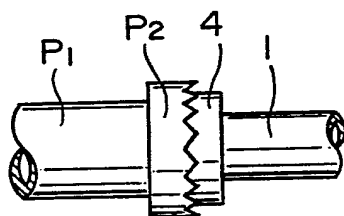


FIG.8

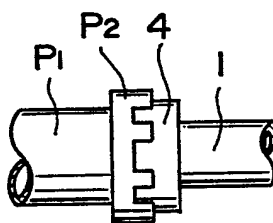


FIG.9(a)

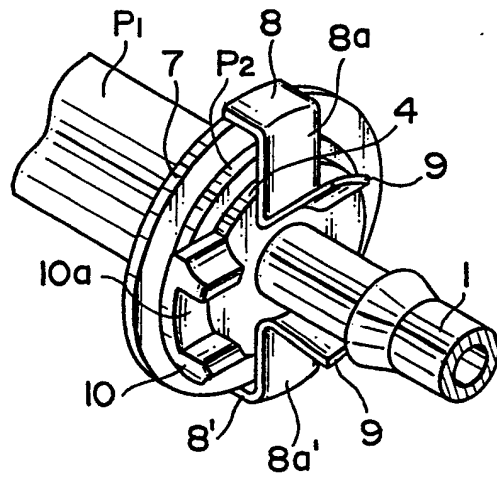


FIG.9(b)

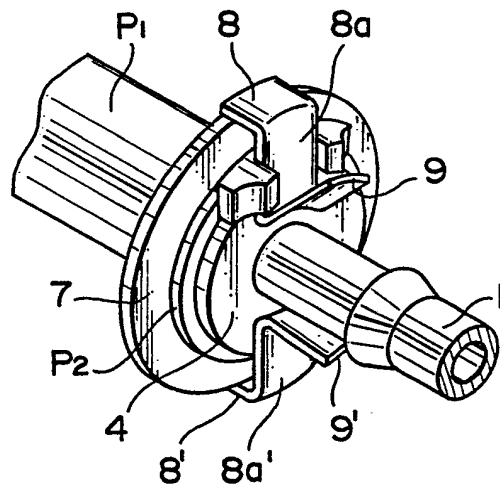


FIG.10

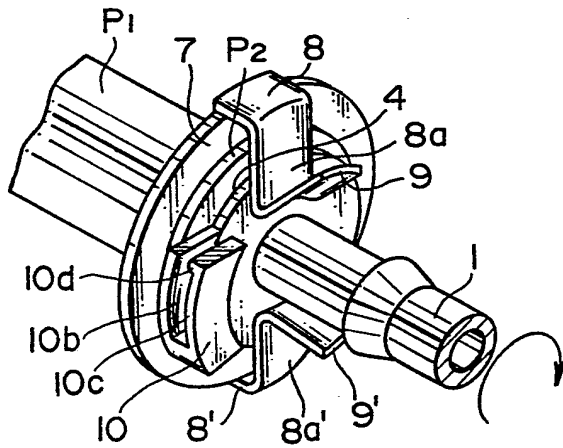


FIG.11(a)

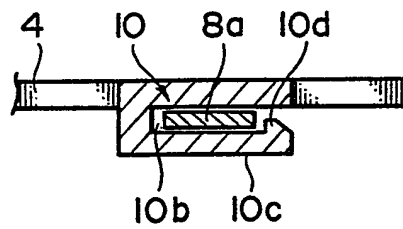


FIG.11(b)

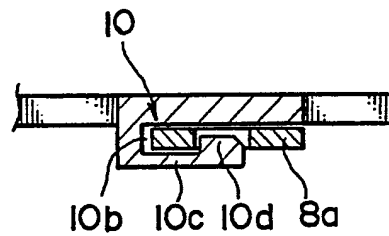
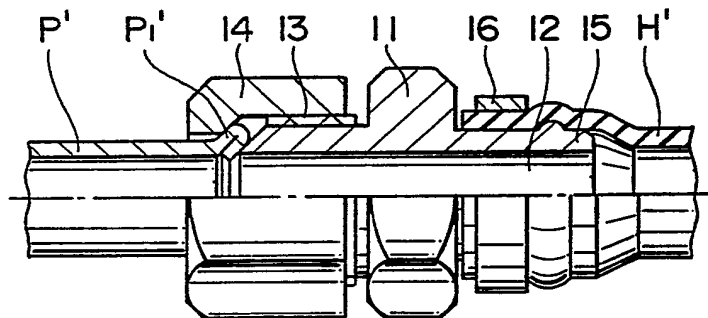


FIG.12

PRIOR ART



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HOSE PIPE CONNECTOR

This invention relates to a connector interposed between a small-diameter metallic pipe (of no larger than 20mm diameter) provided in various machines such as cars as a supply path of oil, air, etc. and a flexible hose, such as a resin tube or rubber hose, and more particularly, to an improvement of a quick connect/disconnect type connector.

A conventional connector is configured as shown in Fig. 12. A joint 11 has a through hole 12 formed therein extending in the axial direction, whose one half has a bearing surface at the end and threads 13 on the periphery thereof, and whose other half has a cylindrical wall 15. To connect a metallic pipe P' and a flexible hose H', a flare end wall P₁' of the metallic pipe P' is brought into contact with the bearing surface and a locknut 14 is screwed, and on the other hand, the flexible hose H' is fitted on the cylindrical wall 15 and a ring member 16 is attached by caulking or the like.

Therefore, when attaching such a conventional connector, the work of connection is troublesome because the locknut 14 must be screwed on one side, it is difficult in an assembly line to make the tightening force on the side of the metallic pipe P' certain, this sometimes causing leakage, the work of connection/disconnection for the joint 11 and the metallic pipe P' is difficult to perform, particularly in a narrow space, and requires a long work time because it requires the work of screwing and a tool such as a spanner.

SUMMARY OF THE INVENTION

In view of the foregoing defects of the prior art, it is an object of the present invention to provide a connector interposed between a metallic pipe and a flexible hose, which makes the work of connection quick and easy, simplifying such a work; makes the clamping force at a connected point substantially certain, avoiding a fear of leakage; requires no tool in the work of connection, facilitating such a work even in a narrow space and thus in an assembly line; and allows the repeated use of it at a disconnected point without difficulty.

To accomplish the foregoing object, the present

invention provides a connector interposed between a small-diameter metallic pipe and a flexible hose, which comprises a joint formed with a through hole extending in the axial direction thereof, and having a protrusion wall and two cylindrical walls projecting therefrom on either side, one of the cylindrical walls having a sealing member fitted in an annular groove formed in the periphery thereof; and a retainer having an engaging wall formed with an opening adapted to be engaged with the one cylindrical wall, and a plurality of elastic arm walls with click walls extending from the engaging wall. In using the foregoing connector, the engaging wall of the retainer is brought into contact with a collar end wall of the metallic pipe, the one cylindrical wall is inserted in the metallic pipe such that the sealing member is pressed by the inner surface of the metallic pipe, the click walls of the elastic arm walls are resiliently clamped by the protrusion wall of the joint, and the flexible hose is fitted on the other cylindrical wall.

The metallic pipe may have an enlarged wall contiguous to the collar end wall, each elastic arm wall may have a snap wall projecting axially outward from its click wall, and each arm wall may also have a clamp pawl projecting axially inward therefrom which is adapted to be

clamped by the collar end wall. The retainer is made of a metallic spring, or resin, or rubber.

According to the present invention, and because of the foregoing structure, the sealing member is pressed by the inner surface of the metallic pipe in which the joint is inserted, the end of the metallic pipe is resiliently clamped by the retainer, and the retainer is clamped by the protrusion wall after its elastic arm walls are opened and closed. Therefore, the work of connection can be completed readily, quickly and reliably, simplifying such a work; the clamping force at a connected point can be made substantially certain, avoiding a fear of leakage; no tool is required in the work of connection, facilitating such a work even in a narrow space and thus in an assembly line; and the repeated use of the connector at a disconnected point is allowed without difficulty.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a sectional view of an embodiment of a connector interposed between a small-diameter metallic pipe and a flexible hose according to the present invention;

Fig. 2 is a side view of a retainer shown in Fig. 1;

Fig. 3 is a perspective view of the retainer shown

in Fig. 2;

Fig. 4 is a sectional view of another embodiment;

Figs. 5(a) and 5(b) are a fragmentary sectional view of a further embodiment and a fragmentary perspective view of the retainer thereof, respectively;

Figs. 6(a) and 6(b) are a fragmentary sectional view of a further embodiment and a fragmentary perspective view of the retainer thereof, respectively;

Fig. 7 is a fragmentary plan view of a further embodiment with no retainer illustrated;

Fig. 8 is a fragmentary plan view of a further embodiment with no retainer illustrated;

Figs. 9(a) and 9(b) are perspective views of a further embodiment in different positions;

Fig. 10 is a fragmentary perspective view of a further embodiment;

Figs. 11(a) and 11(b) are fragmentary sectional views corresponding to Fig. 10; and

Fig. 12 is a sectional view of a conventional connector.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the drawings, the same or similar components are designated by the same reference numeral.

In Figs. 1, 2 and 3, 1 is a joint made of metal which is formed with a through hole 2 extending in the axial direction thereof, and has two cylindrical walls 3 and 5 projecting on either side and an annular protrusion wall 4 arranged between the cylindrical walls 3 and 5, the one cylindrical wall 3 having annular grooves formed in the periphery thereof in which sealing members 3' are fitted. 6 is a retainer made of a metallic spring, or resin, or rubber and formed with an opening 6' adapted to be engaged with the one cylindrical wall 3 of the joint 1, which has an engaging wall 7 around the opening 6' and a plurality of elastic arm walls 8, 8' (only one pair is included in the embodiment) extending axially from the engaging wall 7 to assume an L-shape. The arm walls 8, 8' are bent radially to define click walls 8a, 8a'. 9, 9' are snap walls extending from the click walls 8, 8' of the elastic arm walls 8, 8', which are controlled by a finger pressure to open the elastic arm walls 8, 8', or serve as guides, that is, when the joint 1 is inserted in a metallic pipe P, these snap walls are pushed and opened by the protrusion wall 4 of the joint 1. The metallic pipe P has an enlarged wall P_1 (see Fig. 1) and a collar end wall P_2 contiguous thereto. To connect the metallic pipe P and the joint 1, the metallic pipe P

is fitted on the joint 1 such that the inner surface of the enlarged wall P_1 presses the sealing members 3', and the click walls 8a, 8a' of the elastic arm walls 8, 8' are resiliently clamped by the protrusion wall 4 of the joint 1, with the result that the engaging wall 7 of the retainer 6 is held in contact with the collar end wall P_2 . H is a flexible hose, such as a resin tube or rubber hose, which is fitted on the other cylindrical wall 5.

The metallic pipe P may not be provided with the enlarged wall P_1 as shown in Fig. 4. However, by providing the enlarged wall P_1 , it is possible to make the inner diameter of the through hole 2 of the joint 1 close to the inner diameter of the metallic pipe P, thereby decreasing a flow passage resistance.

Further, to facilitate attaching and detaching of the retainer 6 and increase its clamping force, a clamp pawl 8b extending axially inward may be provided integrally on the elastic arm wall 8, 8' as shown in Fig. 4, whose point is adapted to be clamped by the collar end wall P_2 .

Figs. 5 and 6 show further embodiments which are characterized in that to facilitate attaching and detaching of the retainer 6 to and from the joint 1, the point about which the elastic arm wall 8, 8' is opened is

shifted toward the metallic pipe P and the longitudinal length of the elastic arm wall 8, 8' is increased. Specifically, the elastic arm wall of the embodiment shown in Fig. 5 that extends from the engaging wall 7 is bent to assume a substantial C-shape, whereas that of Fig. 6 assumes a substantial U-shape.

Further, where it is desired to prevent relative rotation between the metallic pipe P and the joint 1, the opposing surfaces of the collar end wall P_2 of the metallic pipe P and the protrusion wall 4 of the joint 1 may be changed to sawtooth-like surfaces for mutual engagement as shown in Fig. 7, or may be formed with radial grooves and protrusions for mutual engagement as shown in Fig. 8.

Further, where it is desired to prevent relative rotation between the retainer 6 and the joint 1, the protrusion wall 4 of the joint 1 may be formed or provided with a pair of engaging block members 10 as shown in Figs. 9(a) and 9(b) (only one block member is illustrated for clarification) each having a groove 10a. The groove 10a has a width substantially identical with the width of the click wall 8a, 8a' of the retainer 6, and is adapted, upon rotation of the joint 1 or the retainer 6, to be engaged with the click wall 8a, 8a', thereby preventing relative rotation of them as shown in Fig. 9(b).

Instead of configuring the engaging block member 10 as shown in Figs. 9(a) and 9(b), the engaging block member may be formed as having a U-shape which is open in the circumferential direction as shown in Fig. 10. That is, the engaging block member 10 of Fig. 10 has a grip wall 10c and a protrusion portion 10d with leaving a groove 10b thereinside. Upon rotation of the joint 1 or the retainer 6, the click wall 8a, 8a' is received in the groove 10b as shown in Fig. 11(a), so that the click wall is kept in place by the protrusion portion 10d. Where it is desired to make the retention of the click wall 8a, 8a' more reliable, a hole 8b may be formed in a central portion of the click wall as shown in Fig. 11(b). In this case, the protrusion portion 10d is received in this hole 8b upon rotation.

Further, where it is desired to prevent relative rotation among the metallic pipe P, joint 1, and retainer 6, this can be accomplished by selectively combining the embodiments of Figs. 7 through 11(b).

As described above, in the connector adapted to be interposed between a small-diameter metallic pipe and a flexible hose according to the present invention, the end of the metallic pipe P is brought into contact with the engaging wall 7 of the retainer 6, the joint 1 is inserted

in the metallic pipe P such that the metallic pipe P presses the sealing members 3' provided on the periphery of the joint 1, and the click walls 8a, 8a' of the elastic arm walls 8, 8' are resiliently clamped by the protrusion wall 4 of the joint 1, that is, the retainer 6 is kept in place by the opening and closing of the elastic arm walls 8, 8' caused by the protrusion wall 4. Therefore, the work of connection can be completed readily, quickly and reliably, simplifying such a work; the clamping force at a connected point can be made substantially certain, avoiding a fear of leakage; no tool is required in the work of connection, facilitating such a work even in a narrow space and thus in an assembly line; the repeated use of the connector at a disconnected point is allowed without difficulty; and the relative rotation of the metallic pipe, retainer and joint can be prevented.

CLAIMS

1. A pipe connector comprising a connector body having cylindrical end portions each fitted to one of the pipes to be connected and a through-hole providing a flow path communicating between the pipes and a retaining clip fitted around one of the pipes to engage behind a projection thereon and having resilient arms engaging an abutment on the connector body.

2. A connector interposed between a pipe and a flexible hose comprising a connector body formed with a through hole extending in the axial direction thereof, and having an abutment and a cylindrical end portion on either side thereof, one of the cylindrical end portions having a sealing member fitted in an annular groove formed in the periphery thereof, and a retaining clip having an engaging wall formed with an opening adapted to be engaged with the said one cylindrical end portion, and two or more resilient arms extending in the axial direction, each of the arms having a radially extending catch, wherein the pipe is adapted to be fitted on the said one cylindrical end portion to over the sealing member and has a projection for contact with the retaining clip, and the flexible hose is adapted to be fitted on the other cylindrical end portion.

3. A connector according to claim 1 or claim 2, wherein the pipe projection comprises a collar wall at the end of the pipe.

4. A connector according to any preceding claim, wherein each of the resilient arms has a substantial L-shape, a substantial

C-shape, or a substantial U-shape.

5. A connector according to claim 2, wherein each catch has a snap wall projecting therefrom axially outward, which is adapted to be controlled by a finger pressure.

6. A connector according to any preceding claim, wherein each resilient arm has a clamp pawl projecting therefrom axially inward, which is adapted to be clamped by the projection on the pipe.

7. A connector according to any preceding claim, wherein the retaining clip is made of a metallic spring, or resin, or rubber.

8. A connector according to any preceding claim, wherein the opposing surfaces of the projection on the pipe and the abutment on the connector body are formed with protrusions and grooves for mutual engagement.

9. A connector according to any preceding claim, wherein the retaining clip and the connector body have means for preventing their relative rotation.

10. A connector according to claim 9, wherein the preventing means are engaging block members on the periphery of a protrusion wall providing the said abutment, which are adapted to be engaged with the resilient arms of the retaining clip.

11. A connector constructed and arranged substantially as

hereinbefore described with reference to and as illustrated in
Figures 1 to 11 of the accompanying drawings.